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Effective Spin Hamiltonian, Magnetic Ground States and Low-Energy Excitations of Double Perovskites[1] ONUR ERTEN, ANAMITRA MUKHERJEE, NANDINI TRIVEDI, MOHIT RANDERIA, PATRICK WOODWARD, The Ohio State University — We investigate the T=0 properties of the generalized double exchange model for double perovskites (DP) $A_2BB'O_6$. We present exact analytical results for the effective spin Hamiltonian of a system consisting of two unit cells. This is a generalization of the classic Anderson-Hasegawa analysis for manganites to DPs. Using a variational approach for the core spins, together with an exact diagonalization of the conduction electrons, we determine the magnetic phase boundaries as a function of electron concentration. We find that the wide region of stability for the FM phase depends on the magnitude and the sign of direct B'-B' hopping and a metallic AFM phase at larger doping. Coulomb correlations on the B' site in a self-consistent Hartree-Fock theory, shows that these are unable to stabilize the FM state beyond a critical filling. We compare our results with experiments on $La_xSr_{(2-x)}FeMoO_6$. We compute the spin wave spectrum, and determine the doping dependence of the effective ferromagnetic exchange and compare with exact results on small clusters.

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